

03/02/99
JC557 U.S. PTO

A

Practitioner's Docket No. 915.333

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Box Patent Application
Assistant Commissioner for Patents
Washington, D.C. 20231

JC135 U.S. PTO
09/26/017
03/02/99

NEW APPLICATION TRANSMITTAL

Transmitted herewith for filing is the patent application of
Inventor(s): Heikki Kokkinen

WARNING: 37 C.F.R. § 1.41(a)(1) points out:

"(a) A patent is applied for in the name or names of the actual inventor or inventors.

"(1) The inventorship of a nonprovisional application is that inventorship set forth in the oath or declaration as prescribed by § 1.63, except as provided for in § 1.53(d)(4) and § 1.63(d). If an oath or declaration as prescribed by § 1.63 is not filed during the pendency of a nonprovisional application, the inventorship is that inventorship set forth in the application papers filed pursuant to § 1.53(b), unless a petition under this paragraph accompanied by the fee set forth in § 1.17(i) is filed supplying or changing the name or names of the inventor or inventors."

For (title): Method, Arrangement and Receiver for Establishing Connections in a Multiple-Protocol Communications Network

CERTIFICATION UNDER 37 C.F.R. 1.10*
(Express Mail label number is mandatory.)
(Express Mail certification is optional.)

I hereby certify that this New Application Transmittal and the documents referred to as attached therein are being deposited with the United States Postal Service on this date March 2, 1999, in an envelope as "Express Mail Post Office to Addressee," mailing Label Number EL092376872US, addressed to the: Assistant Commissioner for Patents, Washington, D.C. 20231.

Judith Schick

(type or print name of person mailing paper)

Judith Schick

Signature of person mailing paper

WARNING: Certificate of mailing (first class) or facsimile transmission procedures of 37 C.F.R. 1.8 cannot be used to obtain a date of mailing or transmission for this correspondence.

*WARNING: Each paper or fee filed by "Express Mail" must have the number of the "Express Mail" mailing label placed thereon prior to mailing. 37 C.F.R. 1.10(b).

"Since the filing of correspondence under § 1.10 without the Express Mail mailing label thereon is an oversight that can be avoided by the exercise of reasonable care, requests for waiver of this requirement will not be granted on petition." Notice of Oct. 24, 1996, 60 Fed. Reg. 56,439, at 56,442.

1. Type of Application

This new application is for a(n)

(check one applicable item below)

- ☒ Original (nonprovisional)
☐ Design
☐ Plant

WARNING: Do not use this transmittal for a completion in the U.S. of an International Application under 35 U.S.C. 371(c)(4), unless the International Application is being filed as a divisional, continuation or continuation-in-part application.

WARNING: Do not use this transmittal for the filing of a provisional application.

NOTE: If one of the following 3 items apply, then complete and attach **ADDED PAGES FOR NEW APPLICATION TRANSMITTAL WHERE BENEFIT OF A PRIOR U.S. APPLICATION CLAIMED** and a **NOTIFICATION IN PARENT APPLICATION OF THE FILING OF THIS CONTINUATION APPLICATION**.

- ☐ Divisional.
☐ Continuation.
☐ Continuation-in-part (C-I-P).

2. Benefit of Prior U.S. Application(s) (35 U.S.C. 119(e), 120, or 121)

NOTE: A nonprovisional application may claim an invention disclosed in one or more prior filed copending nonprovisional applications or copending international applications designating the United States of America. In order for a nonprovisional application to claim the benefit of a prior filed copending nonprovisional application or copending international application designating the United States of America, each prior application must name as an inventor at least one inventor named in the later filed nonprovisional application and disclose the named inventor's invention claimed in at least one claim of the later filed nonprovisional application in the manner provided by the first paragraph of 35 U.S.C. 112. Each prior application must also be:

(i) An international application entitled to a filing date in accordance with PCT Article 11 and designating the United States of America; or

(ii) Complete as set forth in § 1.51(b); or

(iii) Entitled to a filing date as set forth in § 1.53(b) or § 1.53(d) and include the basic filing fee set forth in § 1.16; or

(iv) Entitled to a filing date as set forth in § 1.53(b) and have paid therein the processing and retention fee set forth in § 1.21(f) within the time period set forth in § 1.53(f).

37 C.F.R. § 1.78(a)(1).

NOTE: If the new application being transmitted is a divisional, continuation or a continuation-in-part of a parent case, or where the parent case is an International Application which designated the U.S., or benefit of a prior provisional application is claimed, then check the following item and complete and attach **ADDED PAGES FOR NEW APPLICATION TRANSMITTAL WHERE BENEFIT OF PRIOR U.S. APPLICATION(S) CLAIMED**.

WARNING: If an application claims the benefit of the filing date of an earlier filed application under 35 U.S.C. 120, 121 or 365(c), the 20-year term of that application will be based upon the filing date of the earliest U.S. application that the application makes reference to under 35 U.S.C. 120, 121 or 365(c). (35 U.S.C. 154(a)(2) does not take into account, for the determination of the patent term, any application on which priority is claimed under 35 U.S.C. 119, 365(a) or 365(b).) For a c-i-p application, applicant should review whether any claim in the patent that will issue is supported by an earlier application and, if not, the applicant should consider canceling the reference to the earlier filed application. The term of a patent is not based on a claim-by-claim approach. See Notice of April 14, 1995, 60 Fed. Reg. 20,195, at 20,205.

(Application Transmittal [4-1]—page 2 of 11)

WARNING: When the last day of pendency of a provisional application falls on a Saturday, Sunday, or Federal holiday within the District of Columbia, any nonprovisional application claiming benefit of the provisional application must be filed prior to the Saturday, Sunday, or Federal holiday within the District of Columbia. See 37 C.F.R. § 1.78(a)(3).

- ☐ The new application being transmitted claims the benefit of prior U.S. application(s). Enclosed are ADDED PAGES FOR NEW APPLICATION TRANSMITTAL WHERE BENEFIT OF PRIOR U.S. APPLICATION(S) CLAIMED.

3. Papers Enclosed

- A. Required for filing date under 37 C.F.R. § 1.53(b) (Regular) or 37 C.F.R. § 1.153 (Design) Application

 9 Pages of specification

 3 Pages of claims

 2 Sheets of drawing

WARNING: DO NOT submit original drawings. A high quality copy of the drawings should be supplied when filing a patent application. The drawings that are submitted to the Office must be on strong, white, smooth, and non-shiny paper and meet the standards according to § 1.84. If corrections to the drawings are necessary, they should be made to the original drawing and a high-quality copy of the corrected original drawing then submitted to the Office. Only one copy is required or desired. For comments on proposed then-new 37 CFR 1.84, see Notice of March 9, 1988 (1990 O.G. 57-62).

NOTE: "Identifying indicia, if provided, should include the application number or the title of the invention, inventor's name, docket number (if any), and the name and telephone number of a person to call if the Office is unable to match the drawings to the proper application. This information should be placed on the back of each sheet of drawing a minimum distance of 1.5 cm. (5/8 inch) down from the top of the page . . ." 37 C.F.R. 1.84(c).

(complete the following, if applicable)

- ☐ The enclosed drawing(s) are photograph(s), and there is also attached a "PETITION TO ACCEPT PHOTOGRAPH(S) AS DRAWING(S)." 37 C.F.R. 1.84(b).

☒ formal

☐ informal

B. Other Papers Enclosed

 3 Pages of declaration and power of attorney

 1 Pages of abstract

 Other

4. Additional papers enclosed

☒ Amendment to claims

☐ Cancel in this applications claims _____ before calculating the filing fee. (At least one original independent claim must be retained for filing purposes.)

☐ Add the claims shown on the attached amendment. (Claims added have been numbered consecutively following the highest numbered original claims.)

☒ Preliminary Amendment

☒ Information Disclosure Statement (37 C.F.R. 1.98)

☒ Form PTO-1449 (PTO/SB/08A and 08B)

☒ Citations

- ☐ Declaration of Biological Deposit
- ☐ Submission of "Sequence Listing," computer readable copy and/or amendment pertaining thereto for biotechnology invention containing nucleotide and/or amino acid sequence.
- ☐ Authorization of Attorney(s) to Accept and Follow Instructions from Representative
- ☐ Special Comments
- ☐ Other

5. Declaration or oath (including power of attorney)

NOTE: A newly executed declaration is not required in a continuation or divisional application provided that the prior nonprovisional application contained a declaration as required, the application being filed is by all or fewer than all the inventors named in the prior application, there is no new matter in the application being filed, and a copy of the executed declaration filed in the prior application (showing the signature or an indication thereon that it was signed) is submitted. The copy must be accompanied by a statement requesting deletion of the names of person(s) who are not inventors of the application being filed. If the declaration in the prior application was filed under § 1.47, then a copy of that declaration must be filed accompanied by a copy of the decision granting § 1.47 status or, if a nonsigning person under § 1.47 has subsequently joined in a prior application, then a copy of the subsequently executed declaration must be filed. See 37 C.F.R. §§ 1.63(d)(1)–(3).

NOTE: A declaration filed to complete an application must be executed, identify the specification to which it is directed, identify each inventor by full name including family name and at least one given name, without abbreviation together with any other given name or initial, and the residence, post office address and country or citizenship of each inventor, and state whether the inventor is a sole or joint inventor. 37 C.F.R. § 1.63(a)(1)–(4).

☒ Enclosed

Executed by

(check all applicable boxes)

☒ inventor(s).

☐ legal representative of inventor(s).
37 CFR 1.42 or 1.43.

☐ joint inventor or person showing a proprietary interest on behalf of inventor who refused to sign or cannot be reached.

☐ This is the petition required by 37 CFR 1.47 and the statement required by 37 CFR 1.47 is also attached. See item 13 below for fee.

☐ Not Enclosed.

NOTE: Where the filing is a completion in the U.S. of an International Application or where the completion of the U.S. application contains subject matter in addition to the International Application, the application may be treated as a continuation or continuation-in-part, as the case may be, utilizing ADDED PAGE FOR NEW APPLICATION TRANSMITTAL WHERE BENEFIT OF PRIOR U.S. APPLICATION CLAIMED.

☐ Application is made by a person authorized under 37 C.F.R. 1.41(c) on behalf of all the above named inventor(s).

(The declaration or oath, along with the surcharge required by 37 CFR 1.16(e) can be filed subsequently).

☐ Showing that the filing is authorized.
(not required unless called into question. 37 CFR 1.41(d))

(Application Transmittal [4-1]—page 4 of 11)

6. Inventorship Statement

WARNING: If the named inventors are each not the inventors of all the claims an explanation, including the ownership of the various claims at the time the last claimed invention was made, should be submitted.

The inventorship for all the claims in this application are:

☐ The same.

or

☐ Not the same. An explanation, including the ownership of the various claims at the time the last claimed invention was made,

☐ is submitted.

☐ will be submitted.

7. Language

NOTE: An application including a signed oath or declaration may be filed in a language other than English. An English translation of the non-English language application and the processing fee of \$130.00 required by 37 CFR 1.17(k) is required to be filed with the application, or within such time as may be set by the Office. 37 CFR 1.52(d).

☒ English

☐ Non-English

☐ The attached translation includes a statement that the translation is accurate. 37 C.F.R. 1.52(d).

8. Assignment

☒ An assignment of the invention to Nokia Technology GmbH

☒ is attached. A separate ☒ "COVER SHEET FOR ASSIGNMENT (DOCUMENT) ACCOMPANYING NEW PATENT APPLICATION" or ☐ FORM PTO 1595 is also attached.

☐ will follow.

NOTE: "If an assignment is submitted with a new application, send two separate letters—one for the application and one for the assignment." Notice of May 4, 1990 (1114 O.G. 77-78).

WARNING: A newly executed "CERTIFICATE UNDER 37 CFR 3.73(b)" must be filed when a continuation-in-part application is filed by an assignee. Notice of April 30, 1993, 1150 O.G. 62-64.

(Application Transmittal [4-1]—page 5 of 11)

9. Certified Copy

Certified copy(ies) of application(s)

Finland

980515

March 6, 1998

Country	Appln. No.	Filed
Country	Appln. No.	Filed
Country	Appln. No.	Filed

from which priority is claimed

☐ is (are) attached.☒ will follow.

NOTE: The foreign application forming the basis for the claim for priority must be referred to in the oath or declaration. 37 CFR 1.55(a) and 1.63.

NOTE: This item is for any foreign priority for which the application being filed directly relates. If any parent U.S. application or International Application from which this application claims benefit under 35 U.S.C. 120 is itself entitled to priority from a prior foreign application, then complete item 18 on the ADDED PAGES FOR NEW APPLICATION TRANSMITTAL WHERE BENEFIT OF PRIOR U.S. APPLICATION(S) CLAIMED.

10. Fee Calculation (37 C.F.R. 1.16)A. ☒ Regular application

CLAIMS AS FILED			
Number filed	Number Extra	Rate	Basic Fee 37 C.F.R. 1.16(a) \$760.00
Total 11			
Claims (37 CFR 1.16(c)) - 20 =		×	\$ 18.00
Independent 5	2		156.00
Claims (37 CFR 1.16(b)) - 3 =		×	\$ 78.00
Multiple dependent claim(s), if any (37 CFR 1.16(d))		+	\$260.00

☐ Amendment cancelling extra claims is enclosed.☐ Amendment deleting multiple-dependencies is enclosed.☐ Fee for extra claims is not being paid at this time.

NOTE: If the fees for extra claims are not paid on filing they must be paid or the claims cancelled by amendment, prior to the expiration of the time period set for response by the Patent and Trademark Office in any notice of fee deficiency. 37 CFR 1.16(d).

Filing Fee Calculation \$ 916.00

B. ☐ Design application

\$310.00 —37 CFR 1.16(f)

Filing Fee Calculation \$

C. ☐ Plant application

\$480.00 —37 CFR 1.16(g)

Filing fee calculation \$

11. Small Entity Statement(s)

- ☐ Statement(s) that this is a filing by a small entity under 37 CFR 1.9 and 1.27 is (are) attached.

WARNING: "Status as a small entity must be specifically established in each application or patent in which the status is available and desired. Status as a small entity in one application or patent does not affect any other application or patent, including applications or patents which are directly or indirectly dependent upon the application or patent in which the status has been established. The refiling of an application under § 1.53 as a continuation, division, or continuation-in-part (including a continued prosecution application under § 1.53(d)), or the filing of a reissue application requires a new determination as to continued entitlement to small entity status for the continuing or reissue application. A nonprovisional application claiming benefit under 35 U.S.C. 119(e), 120, 121, or 365(c) of a prior application, or a reissue application may rely on a statement filed in the prior application or in the patent if the nonprovisional application or the reissue application includes a reference to the statement in the prior application or in the patent or includes a copy of the statement in the prior application or in the patent and status as a small entity is still proper and desired. The payment of the small entity basic statutory filing fee will be treated as such a reference for purposes of this section." 37 C.F.R. § 1.28(a)(2).

(complete the following, if applicable)

- ☐ Status as a small entity was claimed in prior application
 _____ / _____, filed on _____, from which benefit
 is being claimed for this application under:

35 U.S.C. ☐ 119(e),
☐ 120,
☐ 121,
☐ 365(c),

and which status as a small entity is still proper and desired.

- ☐ A copy of the statement in the prior application is included.

Filing Fee Calculation (50% of A, B or C above)

\$ _____

NOTE: Any excess of the full fee paid will be refunded if small entity status is established and a refund request are filed within 2 months of the date of timely payment of a full fee. The two-month period is not extendable under § 1.136. 37 CFR 1.28(a).

12. Request for International-Type Search (37 C.F.R. 1.104(d))

(complete, if applicable)

- ☐ Please prepare an international-type search report for this application at the time when national examination on the merits takes place.

(Application Transmittal [4-1]—page 7 of 11)

13. Fee Payment Being Made at This Time☐ Not Enclosed☐ No filing fee is to be paid at this time.*(This and the surcharge required by 37 C.F.R. 1.16(e) can be paid subsequently.)*☒ Enclosed☒ Filing fee

\$ 916.00

☒ Recording assignment

(\$40.00; 37 C.F.R. 1.21(h))

(See attached "COVER SHEET FOR
ASSIGNMENT ACCOMPANYING NEW
APPLICATION".)

\$ 40.00

☐ Petition fee for filing by other than all the
inventors or person on behalf of the inventor
where inventor refused to sign or cannot be
reached

(\$130.00; 37 C.F.R. 1.47 and 1.17(i))

\$ _____

☐ For processing an application with a
specification in
a non-English language

(\$130.00; 37 C.F.R. 1.52(d) and 1.17(k))

\$ _____

☐ Processing and retention fee

(\$130.00; 37 C.F.R. 1.53(d) and 1.21(l))

\$ _____

☐ Fee for international-type search report

(\$40.00; 37 C.F.R. 1.21(e))

\$ _____

NOTE: 37 CFR 1.21(f) establishes a fee for processing and retaining any application that is abandoned for failing to complete the application pursuant to 37 CFR 1.53(f) and this, as well as the changes to 37 CFR 1.53 and 1.78(a)(1), indicate that in order to obtain the benefit of a prior U.S. application, either the basic filing fee must be paid, or the processing and retention fee of § 1.21(f) must be paid, within 1 year from notification under § 53(f).

Total fees enclosed

\$ 956.00

14. Method of Payment of Fees☒ Check in the amount of \$ 956.00☐ Charge Account No. _____ in the amount of
\$ _____

A duplicate of this transmittal is attached.

NOTE: Fees should be itemized in such a manner that it is clear for which purpose the fees are paid. 37 CFR 1.22(b).

(Application Transmittal [4-1]—page 8 of 11)

15. Authorization to Charge Additional Fees

WARNING: If no fees are to be paid on filing, the following items should not be completed.

WARNING: Accurately count claims, especially multiple dependent claims, to avoid unexpected high charges, if extra claim charges are authorized.

- ☒ The Commissioner is hereby authorized to charge the following additional fees by this paper and during the entire pendency of this application to Account No. 23-0442.

☒ 37 C.F.R. 1.16(a), (f) or (g) (filing fees)

☐ 37 C.F.R. 1.16(b), (c) and (d) (presentation of extra claims)

NOTE: Because additional fees for excess or multiple dependent claims not paid on filing or on later presentation must only be paid or these claims cancelled by amendment prior to the expiration of the time period set for response by the PTO in any notice of fee deficiency (37 CFR 1.16(d)), it might be best not to authorize the PTO to charge additional claim fees, except possibly when dealing with amendments after final action.

☐ 37 C.F.R. 1.16(e) (surcharge for filing the basic filing fee and/or declaration on a date later than the filing date of the application)

☐ 37 C.F.R. §§ 1.17(a)(1)–(5) (extension fees pursuant to § 1.136(a)).

☐ 37 C.F.R. 1.17 (application processing fees)

NOTE: ". . . A written request may be submitted in an application that is an authorization to treat any concurrent or future reply, requiring a petition for an extension of time under this paragraph for its timely submission, as incorporating a petition for extension of time for the appropriate length of time. An authorization to charge all required fees, fees under § 1.17, or all required extension of time fees will be treated as a constructive petition for an extension of time in any concurrent or future reply requiring a petition for an extension of time under this paragraph for its timely submission. Submission of the fee set forth in § 1.17(a) will also be treated as a constructive petition for an extension of time in any concurrent reply requiring a petition for an extension of time under this paragraph for its timely submission." 37 C.F.R. § 1.136(a)(3).

☐ 37 C.F.R. 1.18 (issue fee at or before mailing of Notice of Allowance, pursuant to 37 C.F.R. 1.311(b))

NOTE: Where an authorization to charge the issue fee to a deposit account has been filed before the mailing of a Notice of Allowance, the issue fee will be automatically charged to the deposit account at the time of mailing the notice of allowance. 37 CFR 1.311(b).

NOTE: 37 CFR 1.28(b) requires "Notification of any change in status resulting in loss of entitlement to small entity status must be filed in the application . . . prior to paying, or at the time of paying, . . . the issue fee. . . ." From the wording of 37 CFR 1.28(b), (a) notification of change of status must be made even if the fee is paid as "other than a small entity" and (b) no notification is required if the change is to another small entity.

(Application Transmittal [4-1]—page 9 of 11)

16. Instructions as to Overpayment

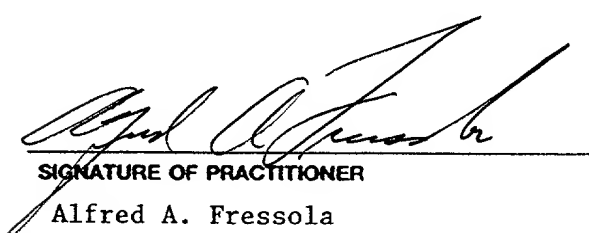
NOTE: "... Amounts of twenty-five dollars or less will not be returned unless specifically requested within a reasonable time, nor will the payer be notified of such amounts; amounts over twenty-five dollars may be returned by check or, if requested, by credit to a deposit account." 37 C.F.R. § 1.26(a).

- ☒ Credit Account No. 23-0442
- ☐ Refund

Reg. No. 27,550

Tel. No. (203) 261-1234

Customer No. 004955


SIGNATURE OF PRACTITIONER

Alfred A. Fressola

(type or print name of attorney)

WARE, FRESSOLA, VAN DER SLUYS & ADOLPHSON LLP
755 Main Street, Building Five

P.O. Address

PO Box 224
Monroe, CT 06468

☒ **Incorporation by reference of added pages**

(check the following item if the application in this transmittal claims the benefit of prior U.S. application(s) (including an international application entering the U.S. stage as a continuation, divisional or C-I-P application) and complete and attach the ADDED PAGES FOR NEW APPLICATION TRANSMITTAL WHERE BENEFIT OF PRIOR U.S. APPLICATION(S) CLAIMED)

- ☐ Plus Added Pages for New Application Transmittal Where Benefit of Prior U.S. Application(s) Claimed

Number of pages added _____

- ☐ Plus Added Pages for Papers Referred to in Item 4 Above

Number of pages added _____

- ☒ Plus added pages deleting names of inventor(s) named in prior application(s) who is/are no longer inventor(s) of the subject matter claimed in this application.

Number of pages added 3

- ☒ Plus "Assignment Cover Letter Accompanying New Application"

Number of pages added 3

☐ **Statement Where No Further Pages Added**

(if no further pages form a part of this Transmittal, then end this Transmittal with this page and check the following item)

- ☐ This transmittal ends with this page.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In the matter of:	Kokkinen)	
)	
Serial No:)	Group Art Unit
)	Examiner:
Filed: Herewith)	
)	
For: Method, Arrangement and Receiver)	
for Establishing Connections in a)	
Multiple-Protocol Communications Network)	

ASSISTANT COMMISSIONER FOR PATENTS
WASHINGTON, D.C. 20231

PRELIMINARY AMENDMENT

Sir:

Please preliminarily amend the above-referenced U.S. application as follows:

In the Specification:

On page 1, prior to line 3, please insert a new heading as follows:

--Technical Field--.

On page 1, prior to line 7, please insert a new heading as follows:

--Background of the Invention--.

On page 2, prior to line 1, please insert a new heading as follows:

--Summary of the Invention--.

On page 3, prior to line 22, please insert a new heading as follows:

--Brief Description of the Drawings--.

Express Mail No. EL092376872US

On page 3, prior to line 29, please insert a new heading as follows:

--Best Mode for Carrying Out the Invention--.

In the Claims:

In Claim 1, line 6, after "(109)", please insert --,--.

In Claim 2, line 5, after "protocol", please insert --,--.

In Claim 4, line 3, after "changes", please insert --,--.

In Claim 5, line 4, after "(109)", please insert --,--.

In Claim 6, line 7, after "unit", please insert --,--.

In the Abstract:

On page 13, line 1, please delete "Abstract" and substitute a new heading as follows:

--Abstract of the Disclosure--.

On page 13, line 15, please delete "Fig. 1".

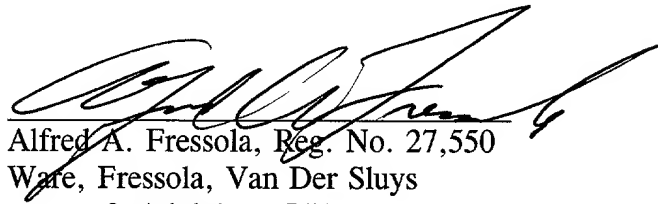
Remarks

This preliminary amendment is filed for the purpose of placing the application into standard U.S. format. Consideration and allowance of the claims is earnestly solicited.

Respectfully submitted,

Date:

3/2/99



Alfred A. Fressola, Reg. No. 27,550

Ware, Fressola, Van Der Sluys
& Adolphson LLP

Bradford Green, Building Five
755 Main Street, PO Box 224
Monroe, CT 06468
(203) 261-1234

Method, arrangement and receiver for establishing connections in a multiple-protocol communications network

The invention relates to establishing a signaling connection between a central unit and a terminal unit in a communications system wherein the central unit
5 and the terminal unit does not know in advance each other's capability of supporting various signaling protocols.

At its simplest a multiple access network comprises one central unit and a plurality of terminal units each of which can at times be in a unidirectional or bi-directional signaling connection with the central unit. Typical future
10 multiple access networks include networks that are being developed in order to replace the current cable TV networks and in which the physical connection between the central unit and terminal units may be based e.g. on cable, optical fiber, a combination of those (hybrid fiber coax, HFC), satellite links, terrestrial radio links, local multipoint distribution system (LMDS) or
15 microwave multipoint distribution system (MMDS). For connection management, there are several protocols available. For simplicity, the connection management protocol can be called by a generic name CC (call/connection control).

With a point-to-point connection the connection management protocols are
20 considerably simpler. However, since the transmission medium is common to the whole multiple access network, a special medium access control (MAC) protocol is needed below the CC in the transmission protocol hierarchy to extract a logical point-to-point channel from the capacity offered by the common transmission medium. In the open systems interconnection (OSI)
25 model, MAC is a sub-layer of the second, i.e. data link, layer and CC is a protocol of the third, or network, layer.

Because of the multitude of protocols and hardware and software manufacturers it is possible that one wants to have in one and the same multiple access network devices that support different protocols. Then one is
30 faced with the problem of implementing the signaling between the devices. A known solution is to install in the network or in connection with devices connected to the network protocol converters to carry out the necessary conversions between protocols. However, acquisition and installation of various accessories in the communications system is disadvantageous from
35 the usability standpoint and protocol conversions also involve factors of uncertainty.

An object of the present invention is to provide a method, system and the required apparatus with which the problem caused by different CC protocols in a multiple access network can be solved. A particular object of the invention is that the solution according to the invention does not limit the number of usable protocols and does not exclude the possibility of creating wholly new protocols.

The objects of the invention are achieved by including at least in the central unit means for using a certain CC protocol or several mutually alternative CC protocols and by realizing at MAC level negotiation between a terminal unit and the central unit about the CC protocol used in the connection.

The central unit according to the invention is characterized in that it is equipped so as to use at least one signaling protocol in a signaling connection with a terminal unit of a communications system, to which end it comprises means for indicating to the terminal unit the signaling protocols supported by the central unit and means for establishing through a network interface in the central unit a signaling connection between a signaling unit in the central unit and the terminal unit, using the signaling protocol chosen.

The invention also pertains to a terminal unit which is characterized in that it is equipped so as to use in a signaling connection with a central unit of a communications system at least one signaling protocol, to which end it comprises means for

- indicating to the central unit in response to a message sent by the central unit the capability of the terminal unit of supporting a particular signaling protocol, and
- establishing through a network interface in the terminal unit a signaling connection between a signaling unit in the terminal unit and the central unit, using a signaling protocol supported by the terminal unit.

The invention also pertains to a communications system characterized in that it comprises a central unit like the one described above and at least one terminal unit like the one described above.

Furthermore, the invention pertains to a method characterized in that it comprises steps in which

- by means of communication between the central unit's network interface and a terminal unit's network interface information is created about the signaling protocol supported by the terminal unit, and

- signaling is started using a signaling unit in the central unit that supports the same signaling protocol as the terminal unit.

In accordance with the invention a central unit has one or more network signaling units and one or more network interfaces. A terminal unit typically has one signaling unit and one network interface. Before a point-to-point connection at MAC level is established between the central unit and a terminal unit, as required for a signaling connection, the central unit's network interface indicates to the terminal unit's network interface the protocol options available. The central unit may support one signaling protocol only or several alternative signaling protocols. The terminal unit's network interface selects a protocol and indicates its selection to the central unit's network interface which creates a logical connection with the right network signaling unit in the central unit on the one hand and with the network interface in the terminal unit on the other hand. If there exists in the terminal unit no logical connection between the network interface and the signaling unit, one is created, whereafter the entire logical connection from the central unit's network signaling unit via the network interfaces to the terminal unit's signaling unit is complete and signaling can proceed using the selected protocol. The invention does not limit the setup or release of other simultaneous connections between above-mentioned units or elsewhere in the network.

The invention will now be described in more detail with reference to the preferred embodiments presented by way of example and to the accompanying drawing wherein

- Fig. 1 shows a communications system according to the invention,
Fig. 2 shows the principle of the invention in the system of Fig. 1, and
Fig. 3 shows an apparatus according to the invention.

Like elements in the drawing are denoted by like reference designators.

Fig. 1 shows a communications system 100 including a central unit 101 and a plurality of terminal units 102, 103 and 104. In this case the central unit has two network signaling units 105 and 106 and two network interfaces 107 and 108. Their mutual connections can be arranged in such a manner that any network signaling unit can use any network interface. Each terminal unit has a network interface 109 and a signaling unit 110. The central unit 101 is connected with the terminal units 102, 103 and 104 via a physical transmission medium 111, which may be one of the transmission media

mentioned above in the description of the prior art. The connection between a given signaling unit and the transmission medium is always routed via a certain network interface.

Let us assume that a signaling connection is required between a central unit
5 101 and terminal unit 102 using the network interface 107 in the central unit and the network interface 109 in the terminal unit. Fig. 2 illustrates the exchange of messages between the different units in accordance with a preferred embodiment of the invention. Message 201 is used by the central unit's network interface 107 to indicate to the terminal unit's network interface
10 109 which signaling protocols are supported by the central unit. In response, the terminal unit's network interface 109 sends message 202 indicating the protocol chosen by the terminal unit. Messages 203 and 204 represent the establishment of a connection in the central unit between the network interface 107 and a network signaling unit that supports the protocol chosen
15 by the terminal unit. In the case depicted by Fig. 2, this is network signaling unit 105.

Message 205 represents the establishment of a logical point-to-point connection according to the MAC protocol. In Fig. 2 it is assumed that the connection between the terminal unit's network interface 109 and the
20 signaling unit 110 is established only when the establishment of the logical point-to-point connection has proceeded from the central unit's network signaling unit 105 to the terminal unit's network interface 109. The last section of the connection is established between the network interface 109 and signaling unit 110, represented by messages 206 and 207. When the
25 logical point-to-point connection between the network signaling unit 105 and signaling unit 110 has been set up, signaling is carried out through it as depicted by arrow 208. When signaling is performed between CC protocol layers, the lower protocol layers, such as MAC, are transparent, i.e. the CC protocol need not take them into account in its operation. In Fig. 2, messages
30 represented by continuous lines belong to the MAC protocol layer and messages represented by broken lines do not.

Above we only discussed the setup of a signaling connection initiated by a central unit. The invention is also applicable to the setup of a signaling connection initiated by a terminal unit. Adapting from Fig. 2, this can be
35 illustrated by mirroring all messages in Fig. 2 with respect to the vertical centerline of the figure.

There are many functions on which a central unit and a terminal unit should be able to negotiate and signaling protocol support is only one of such functions related to connection setup and/or maintenance. It is very likely that in multiple access networks the situation regarding many other functions will eventually be similar: there is a number of mutually alternative ways of realizing a particular function related to connection setup and/or maintenance and the central unit and terminal units cannot know in advance which of the alternative ways the other party of the connection supports. The present invention can then be generalized according to the principles described below.

As regards the invention, it is advantageous that a certain list of codes and related values can be conveyed in messages according to the MAC layer. The invention does not limit these codes and their allowed values. In accordance with a preferred embodiment of the invention a given code is reserved to mean a desired characteristic related to connection setup and/or maintenance, such as call setup, control signaling and so on. Each code is then associated with a value that can be e.g. a one-byte signless integer. This kind of value definition has an obvious connection with the hardware implementation: when a certain number of bytes (say, one) is reserved for the value, it is easy to handle the value in the device by storing it in a particular register. A characteristic related to connection setup and/or maintenance which has alternative ways of implementation can be called a capability in general.

An advantageous way of linking together the code value and the information about the support for a certain alternative way of implementation (e.g. information indicating that a particular protocol is supported) is to assign a certain bit of the value to each certain alternative way of implementation. If the value of the bit is zero, it means the implementation in question is not supported, and if the value is one, it signifies that the implementation in question is supported. The invention does not rule out any other procedure to indicate whether a given way of implementation is supported or not.

Let us assume that code 0x81 is reserved to indicate the support for signaling protocols so that in accordance with a known convention the first part 0x means that the last part 81 is a hexadecimal number. Then, the selection of values related to the code can be carried out e.g. according to the table below.

Table 1

Code	Protocol supported	Value
0x81	(none)	0x00
	Q.2931	0x01
	PPP	0x02
	bootp	0x04
	DSM-CC U-N	0x08
	other protocol 1	0x10
	other protocol 2	0x20
	other protocol 3	0x40
	other protocol 4	0x80

The table shows that the value related to code 0x81 is a certain one-byte (i.e. 8-bit) number. If the least significant bit of the byte is set (i.e. 1), the protocol supported is Q.2931. If the second least significant bit is set, the protocol supported is PPP and so forth. A central unit may support one protocol only or simultaneously several mutually alternative protocols. For example, value 00101101 means that the Q.2931 protocol (00101101), bootp protocol (00101101), DSM-CC U-N protocol (00101101) and other protocol 2 (00101101) are all supported at the same time. Value 0x00 of code 0x81 in this example means that no protocol is supported.

The invention does not specify what MAC-layer messages are used in the negotiations about the support and selection of protocols between a central unit and terminal units. Below are some examples that can be applied in systems complying with existing standards or drafts for standards.

Indication of Protocol Support

In systems complying with the aforementioned standards or drafts for standards, a central unit's network interface may be called INA (Interactive Network Adapter) or NRC (Network Related Control). Similarly, a terminal unit's network interface may be called NIU (Network Interface Unit) or IIM

(Interactive Interface Module). Message 201 in Fig. 2 may be a MAC Default Configuration message sent by INA/NRC, and message 202 may be a MAC Sign-On Response message sent by NIU/IIM. Message 201 then contains a code for signaling protocol support (above, 0x81) and an associated value that indicates the signaling protocols supported by the central unit. Similarly, message 202 contains a code for signaling protocol support and an associated value indicating the signaling protocol selected by the terminal unit. If the terminal unit does not support any of the protocols indicated by the central unit in the MAC Default Configuration message the terminal unit includes in the MAC Sign-On Response message the code for signaling protocol support and sets its value to zero. Alternatively, the terminal unit may send the MAC Sign-On Response message without the code for signaling protocol support and/or the associated value.

Changes in Protocols Supported

If a central unit's capability of supporting certain protocols changes, it can send in a MAC Transmission Control message a value representing the protocols supported after the change. If the change means that support for a particular protocol is removed, the bit representing that protocol is reset. Correspondingly, if support for a new protocol is started, a new 'one' bit appears in the code value. If the list of protocols supported after the change causes a conflict in a terminal unit (for example, a terminal unit does not support any one of the protocols supported after the change) the terminal unit can respond with a MAC Link Management Acknowledge message in which it includes after the signaling code a value wherein bits representing the protocols that cause the conflict are 'ones'. Alternatively, the terminal unit may indicate the conflict by sending a MAC Link Management Acknowledge message without the code for signaling protocol support and/or the associated value.

Inquiring Protocols Supported by Terminal Unit

A central unit may make an inquiry about the protocols supported by a terminal unit by sending a MAC Status Request message in which it includes the code values for the protocols which the inquiry is about. In response, the terminal unit sends a MAC Status Response message in which it includes the code values for the protocols it supports.

The table below illustrates an exemplary method of systematically specifying the contents of the fields which are used in MAC messages to exchange

information about the support for connection setup and/or maintenance capabilities and their alternative implementation methods.

Table 2

Field description	Bits	Bytes
Number_of_Capabilities	(8)	(1)
for (i=0;I<Number_of_Capabilities;i++) {		
Code	(8)	(1)
Value	(8)	(1)
}		

- 5 Table 2 shows that a MAC message first contains a one-byte number which defines how many capabilities related to connection setup and/or maintenance are described in the MAC message in question. Let the value of that number be N, for example. Then follow N pairs of numbers wherein the first number is a code for a certain desired capability related to connection setup and/or
- 10 maintenance and the second number is the value of that code.
- Now an embodiment of the apparatus according to the invention will be described, shown as a simplified block diagram in Fig. 3. In principle, the figure may depict either a central unit or a terminal unit. Block 301 represents the physical part of a network interface, i.e. those known hardware elements
- 15 which are needed to connect the apparatus with the transmission medium. A demultiplexer 302 extracts from the received information flow the transmitted data proper which is directed to a data sink 303, signaling information which is taken to a signaling unit 304, and MAC protocol layer information which is taken to a MAC block 305. The outgoing information flow comprises data
- 20 to be transmitted produced by a data source 306, signaling information coming from the signaling unit 304, and MAC protocol layer information produced by the MAC block 305. The outgoing data are compiled in a multiplexing and addressing unit 307 which sends them via the physical interface part 301. Operation of the other blocks is controlled by a
- 25 management block 308. Comparing the block diagram in Fig. 3 with Fig. 1, the entity comprising blocks 301, 302, 305 and 307 corresponds to the network interface 107, 108 or 109, and block 304 corresponds to the (network) signaling unit 105, 106 or 110.

Exchange of messages according to Fig. 2 produces the following actions between the blocks in Fig. 3:

- management block 308 instructs MAC block 305 to establish a logical point-to-point connection,
- 5 - MAC block 305 sends an inquiry to signaling unit 304 about the protocols supported by the apparatus,
- MAC block 305 establishes a logical point-to-point connection by means of blocks 301 and 307, including in the establishment process information about the protocols supported by the apparatus,
- 10 - MAC block 305 sets the operation of blocks 302 and 307 such that when the logical connection has been established, the data received through it is first taken in the signaling unit 304,
- MAC block 305 informs the signaling unit 304 that the connection has been established, and
- 15 - signaling unit 304 sets the operation of blocks 302 and 307 such that when the connection is used the data packets arriving through it are directed to the data sink 303, and the data produced by the data source 306 are correctly addressed and transmitted.

In Fig. 3, continuous lines represent data flow and broken lines represent control signal flow.

20

Claims

1. A method for establishing a signaling connection with a terminal (102, 103, 104) in a central unit (101) of a communications system, said terminal and central unit comprising a network interface (107, 108, 109) and signaling unit (105, 106, 110), **characterized** in that it comprises steps in which
 - by means of communication between the central unit's network interface (107, 108) and the terminal's network interface (109) information is created about the signaling protocol supported by the terminal, and
 - signaling is started using a signaling unit (105, 106) in the central unit that supports the same signaling protocol as the terminal.
2. The method of claim 1, **characterized** in that therein
 - a message (201) is sent from the central unit's network interface (107) to the terminal, indicating the signaling protocols supported by the central unit,
 - in response to an answer message (202) sent by the terminal indicating the terminal's selection for signaling protocol a connection is established (203, 204) between the central unit's network interface (107) and the central unit's signaling unit (105) that supports the signaling protocol chosen by the terminal, and
 - a point-to-point signaling connection (205) is established between the central unit and the terminal using the signaling protocol selected by the terminal.
3. The method of claim 2, **characterized** in that said message (201) contains a code for signaling protocol support and an associated value which is a binary number and in which each bit represents a particular signaling protocol.
4. The method of claim 3, **characterized** in that in response to a situation in which the central unit's capability of supporting various signaling protocols changes a change message is sent to the terminal indicating the signaling protocols supported by the central unit after the change.
5. The method of claim 1, **characterized** in that therein
 - by means of communication according to the MAC protocol layer between the central unit's network interface (107, 108) and the terminal's network interface (109) information is created about the signaling protocol supported by the terminal, and

- signaling is started using a signaling unit (105, 106) in the central unit that supports the same CC protocol layer signaling protocol as the terminal.

6. A method for establishing a signaling connection with a central unit (101) in a terminal (102, 103, 104) of a communications system, said terminal and central unit comprising a network interface (107, 108, 109) and signaling unit (105, 106, 110), **characterized** in that it comprises steps in which

- in response to a message (201) sent by the central unit's network interface (107) indicating the signaling protocols supported by the central unit an answer message (202) is sent from the terminal's network interface (109) indicating

- the signaling protocol selected by the terminal when the terminal supports a signaling protocol mentioned in said message, or

- the incapability of the terminal of supporting a protocol indicated in the message when the terminal does not support any one of the signaling protocols mentioned in said message, and

- a connection is established (206, 207) between the terminal's network interface (109) and the terminal's signaling unit (110).

7. The method of claim 6, **characterized** in that in response to a situation in which a change message sent by the central unit indicating the signaling protocols supported by the central unit after a change causes a conflict, a message is sent to the central unit including a code for signaling protocol support and an associated value which is a binary number and in which each bit represents a particular signaling protocol and in which the bits that represent protocols that cause a conflict are set.

8. A central unit (101) in a communications system, comprising a signaling unit (105, 106) and a network interface (107, 108), **characterized** in that it is equipped so as to use in a signaling connection with a terminal of the communications system at least one signaling protocol, to which end it comprises means for indicating to the terminal the signaling protocols supported by the central unit and means for setting up a signaling connection via the central unit's network interface, using a selected signaling protocol between the central unit and the terminal.

9. A terminal (102, 103, 104) in a communications system, comprising a signaling unit (110) and a network interface (109), **characterized** in that it is

equipped so as to use in a signaling connection with a central unit of a communications system at least one signaling protocol, to which end it comprises means for

- indicating to the central unit, in response to a message sent by the central unit, the capability of the terminal of supporting a particular signaling protocol, and
- establishing via a network interface in the terminal a signaling connection between a signaling unit in the terminal and the central unit, using a signaling protocol supported by the terminal.

10. A communications system (100) comprising a central unit (101) and terminals (102, 103, 104), **characterized** in that it is equipped so as to set up and maintain a signaling connection between the central unit and at least one terminal, using one signaling protocol, to which end it comprises

- in the central unit, means for indicating to the terminal the signaling protocols supported by the central unit and means for setting up via the central unit's network interface a signaling connection using a selected signaling protocol between the central unit's signaling unit and the terminal, and

- in the terminal, means for

- indicating to the central unit the capability of the terminal of supporting a particular signaling protocol in response to a message sent by the central unit, and
- setting up via a network interface in the terminal a signaling connection between a signaling unit in the terminal and the central unit, using a signaling protocol supported by the terminal.

11. The communications system of claim 10, **characterized** in that it is a multiple access network in which the physical connection (111) between the central unit and the terminals is one of the following: cable, optical fiber, combination of those, satellite link, terrestrial radio link, Local Multipoint Distribution connection, Microwave Multipoint Distribution System connection.

Abstract

A communications system comprises a central unit (101) and terminals (102, 103, 104). It is equipped so as to establish and maintain a signaling connection between the central unit and at least one terminal using one of at least two alternative signaling protocols. To that end it comprises in the central unit means for indicating to a terminal the signaling protocols supported by the central unit, and means for setting up via the central unit's network interface a signaling connection between the central unit's signaling unit and the terminal, using a selected signaling protocol. Correspondingly, in the terminal the system comprises means for indicating to the central unit the signaling protocol supported by the terminal in response to a message sent by the central unit as well as means for setting up via the terminal's network interface a signaling connection between the terminal's signaling unit and the central unit, using a protocol supported by the terminal.

Fig. 1

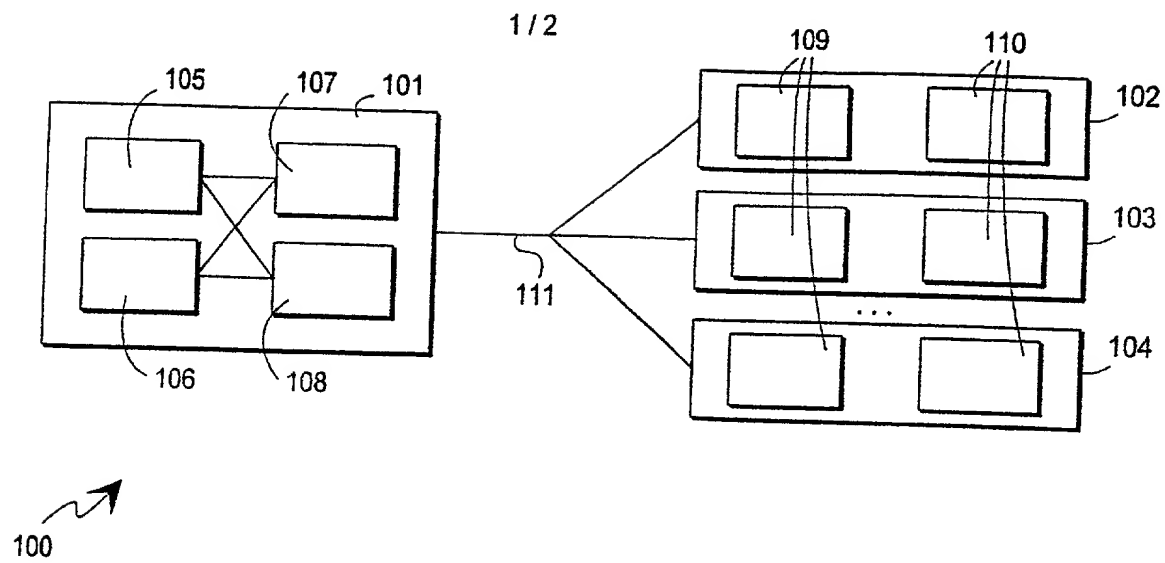


Fig. 1

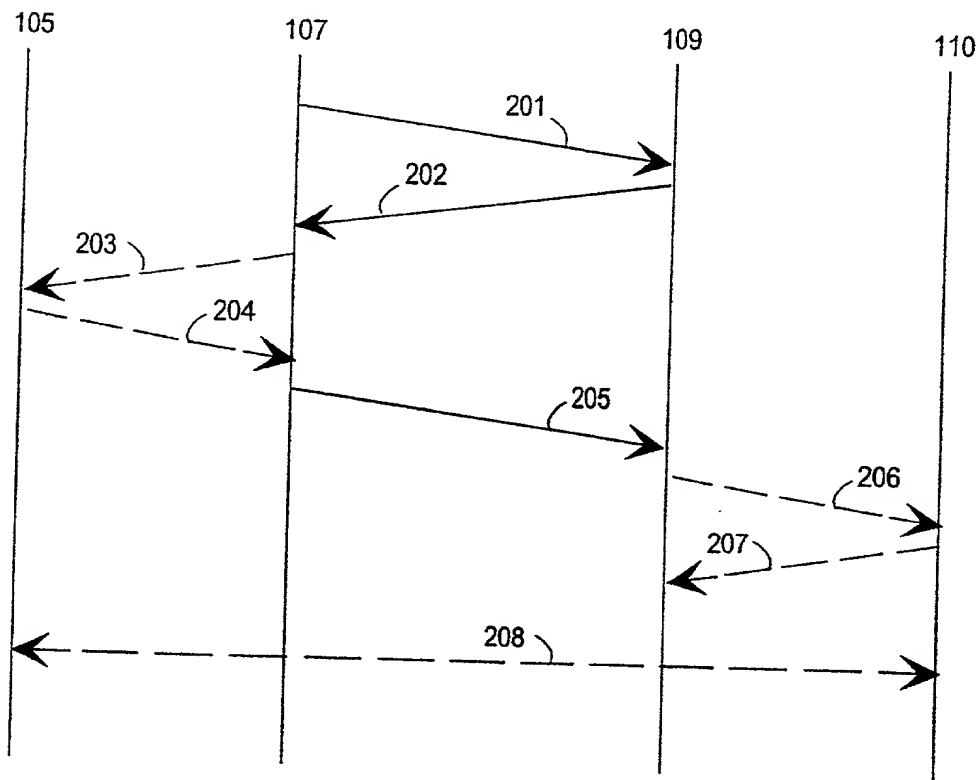


Fig. 2

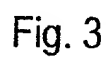


Fig. 3

Declaration and Power of Attorney For Patent Application

Erklärung Für Patentanmeldungen Mit Vollmacht

German Language Declaration

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As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name.

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled

Method, arrangement and
receiver for establishing
connections in a multiple-
protocol communications network

the specification of which

(check one)

☒ is attached hereto.

☐ was filed on _____ as

Application Serial No. 0/

and was amended on _____

(if applicable)

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations, §1.56(a).

I hereby claim foreign priority benefits under Title 35, United States Code, §119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

German Language Declaration

Prior foreign applications

Priorität beansprucht

Priority Claimed

FI 980515

Finland

6/March/1998

(Number)
(Nummer)

(Country)
(Land)

(Day/Month/Year Filed)
(Tag/Monat/Jahr eingereicht)

☒ Yes
Ja

☐ No
Nein

(Number)
(Nummer)

(Country)
(Land)

(Day/Month/Year Filed)
(Tag/Monat/Jahr eingereicht)

☐ Yes
Ja

☐ No
Nein

(Number)
(Nummer)

(Country)
(Land)

(Day/Month/Year Filed)
(Tag/Monat/Jahr eingereicht)

☐ Yes
Ja

☐ No
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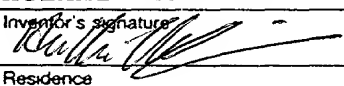
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Unterschrift des Erfinders	Datum	Second Inventor's signature	Date
Wohnsitz		Residence	
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